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A HIBERNATION CAGE FOR THE PINK BOLLWORM

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A hibernation cage that closely approximates outdoor conditions has long been recognized as essential in the biological studies of the pink bollworm (Pectinophora gossypiella (Saund.)). The cage previously used consisted of a 3-foot-square frame made of 1- by 8-inch boards with a removable flat top covered with black sateen cloth. A 5-inch hemispherical screen fly trap was installed in the center of the black cloth for trapping the emerging moths. The frame of the cage was buried 5 or 6 inches in the soil, and infested cotton bolls were placed on the soil surface or buried to the desired depth. The much higher temperature and humidity within the cage than outside stimulated an earlier-than-normal emergence of the moth. Moreover, the efficiency of the cage in trapping the moths was low.

The cage described herein more closely simulates outside conditions; its efficiency in capturing pink bollworm moths is high (82 percent), it can easily be cleaned of weeds since the covers are removable, and it can be stored in a minimum of space inasmuch as the covers can be telescoped into each other. Because of these advantages the cage may prove useful in the study of other insects.

Meteorological records were taken inside and outside the cage at Presidio, Tex., over an 18-day period, May 6 to 23, 1941. The average mean temperature 3 inches above the soil was 84.9° F. inside the cage and 85.3° outside the cage; the respective maximum temperatures were 113° and 112.1°, and the minimum temperature was 68° in both cases. However, the variation in the soil temperature at the 2-inch depth was considerably greater; the average mean temperature was 71.2° inside the cage and 74.3° outside, the maximum temperatures were 86° and 99.5°, and the minimum temperatures 57.2° and 52.7°. Evaporation outside the cage as measured in open metal pans was 1,860 ml. as compared with 1,444 ml. inside. As would be expected, the soil moisture was somewhat higher inside the cage than outside, the percentages being 30.5 and 26.5.

1/ Acknowledgments are due to A. J. Chapman, L. W. Noble, and W. L. Lowry, who contributed to the development of this cage.

Materials and Construction

The following materials are required for one cage:

Lumber (4 pieces of each size): For base, 1 by 8 by 35 1/4 inches (A)[2/] and 2 by 2 by 7 1/2 inches (B); for removable cover, 1 by 1 3/4 by 36 3/8 inches (D), 1 by 1 3/4 by 37 1/8 inches (C), 1 by 1 3/8 by 34 1/2 inches (E), screen molding 37 7/8 inches long, and screen molding 34 1/2 inches long.

Hardware: 8-ounce glass jar, with metal (preferably copper) cap, 5 inches high, having an opening 1 7/8 inches in diameter (F); 1 cone of 16-mesh screen wire 2 1/2 inches high and 1 7/8 inches in diameter at the base to fit into the mouth of the jar (G); 2 pieces of 16-mesh screen wire 34 inches wide cut into rhombic figures with all sides 39 1/4 inches long so that the angles in two opposite corners are 120° and in the other two 60° (fig. 2); and 1 metal ring 6 inches in diameter made of 1/2 by 1/8 inch strap with 4 holes 3/16 inch in diameter and at 90° apart (H).

The construction of the cage is shown in figures 1, 2, and 3.

The base (fig. 1) consists of four pieces of lumber (A)[2/] nailed to four corner blocks (B) for added support and strength. This base is embedded 4 to 6 inches in the ground, and the sides are banked with soil.

The removable cover of the cage consists of a pyramid-shaped wooden frame covered with 16-mesh screen wire (figs. 1 and 3). The lower part of the cover is made by nailing the four pieces of lumber (D) at right angles to the four pieces (C) so that these pieces can fit tightly over the base of the cage. The four ridge pieces of lumber (E) which support the screen pyramid are held in position by screws through the holes in the ring (H).

The screen wire for the cover consists of two rhombic pieces (fig. 2), which when folded along the center of the 120° angles and soldered together, fit over the pyramid frame, leaving a small opening at the apex. The screen is fastened on the wooden frame of the cover by the use of screen molding.

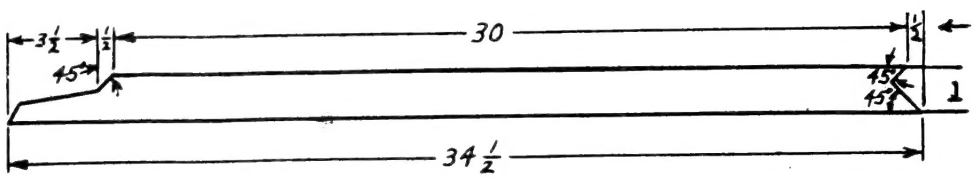
[2/] Letters refer to the various pieces of lumber and hardware as shown in figure 1 and in list of materials required for one cage.

The trap consists of an 8-ounce glass jar (F) with a metal screw top and a small inner screen cone (G) that fits snugly inside the mouth of the jar.

The screen cone (G) is made by forcing the screen wire over a wooden form of the proper size. While the screen cone is still on the form, a small strip of adhesive tape is placed on the wire around the base of the cone to maintain the shape. The cone is then removed, and the wire is trimmed along the bottom edge of the tape. A second piece of tape holds the bottom edge of the screen cone in the mouth of the jar. An opening is made in the apex of the cone with an ice pick or similar instrument, its size depending on the insects to be trapped.

The center of the metal jar cap is cut out with about 3/16 inch of the metal left adjacent to the rim. This metal cap is then soldered to the top of the screen-wire pyramid so that the screw edge of the cap is upward.

The glass jar containing the small screen cone is screwed into the metal cap and is readily removed for counting the insects and for cleaning.



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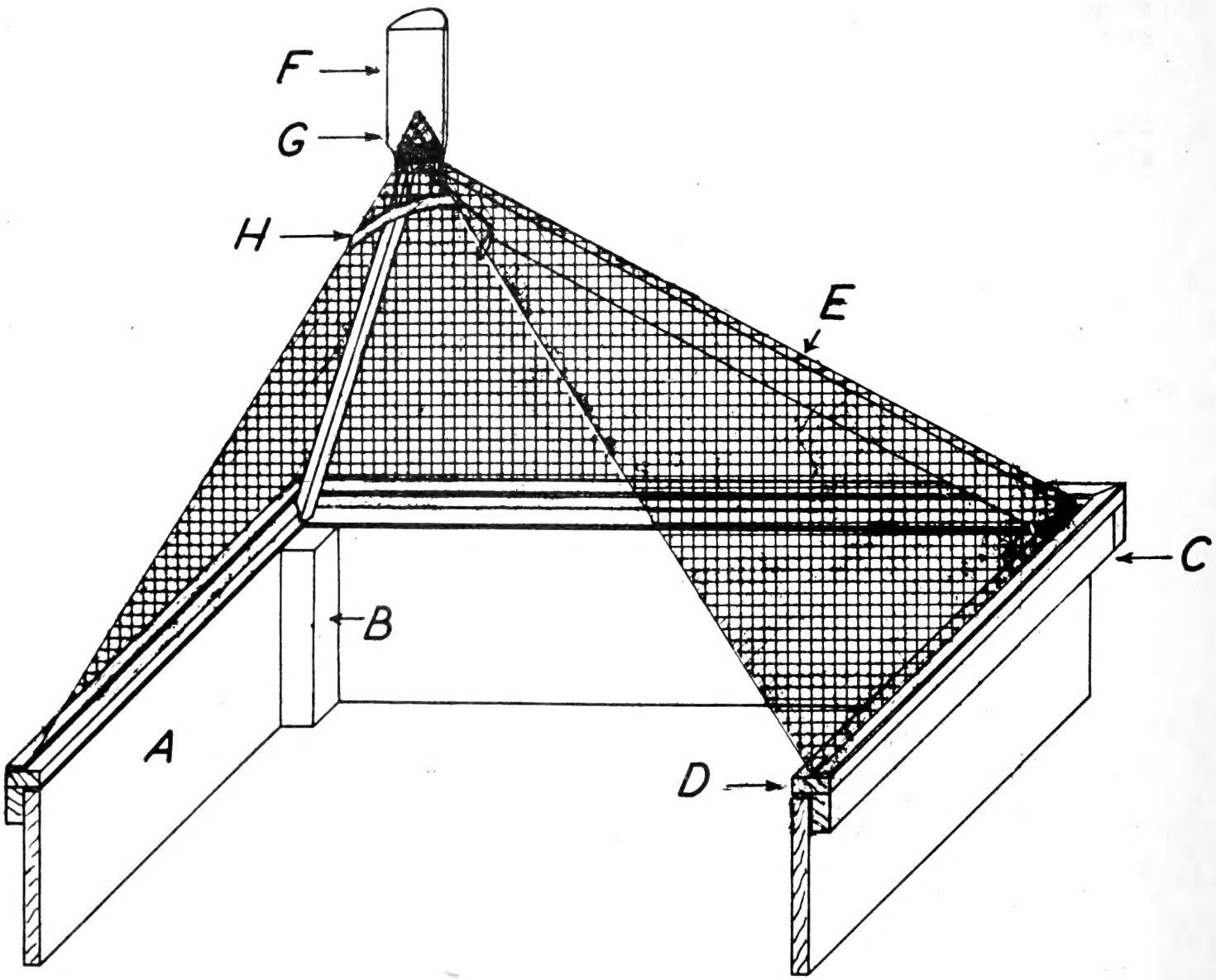

Figure 1.--Oblique cross-sectional drawing of hibernation cage, the letters referring to the same parts of lumber and hardware as given in the list of materials. The method of cutting piece E is also shown.

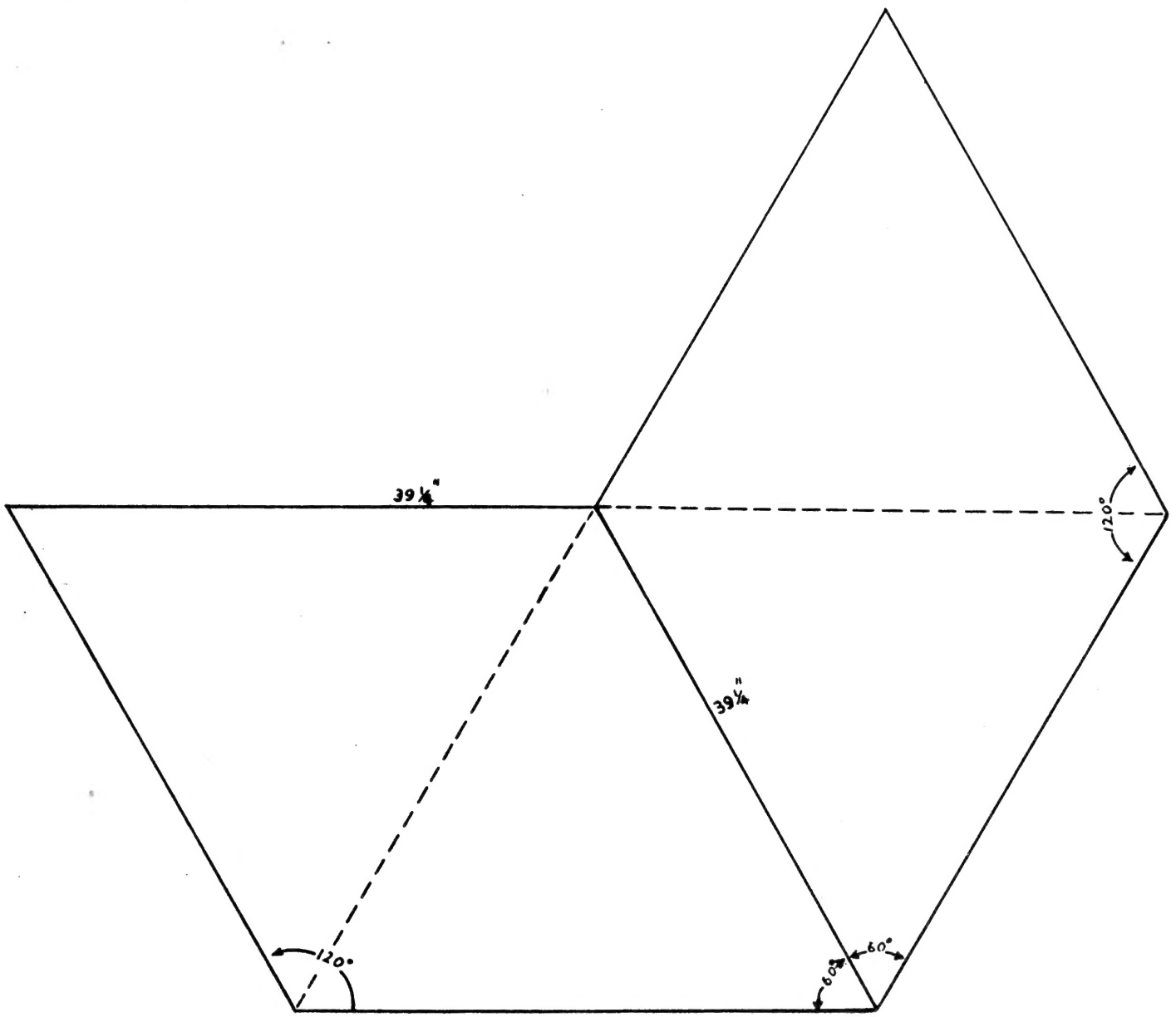

Figure 2.—The two rhombic pieces are folded along the center of the 120° angles and soldered to form the pyramid cover of the hibernation cage.

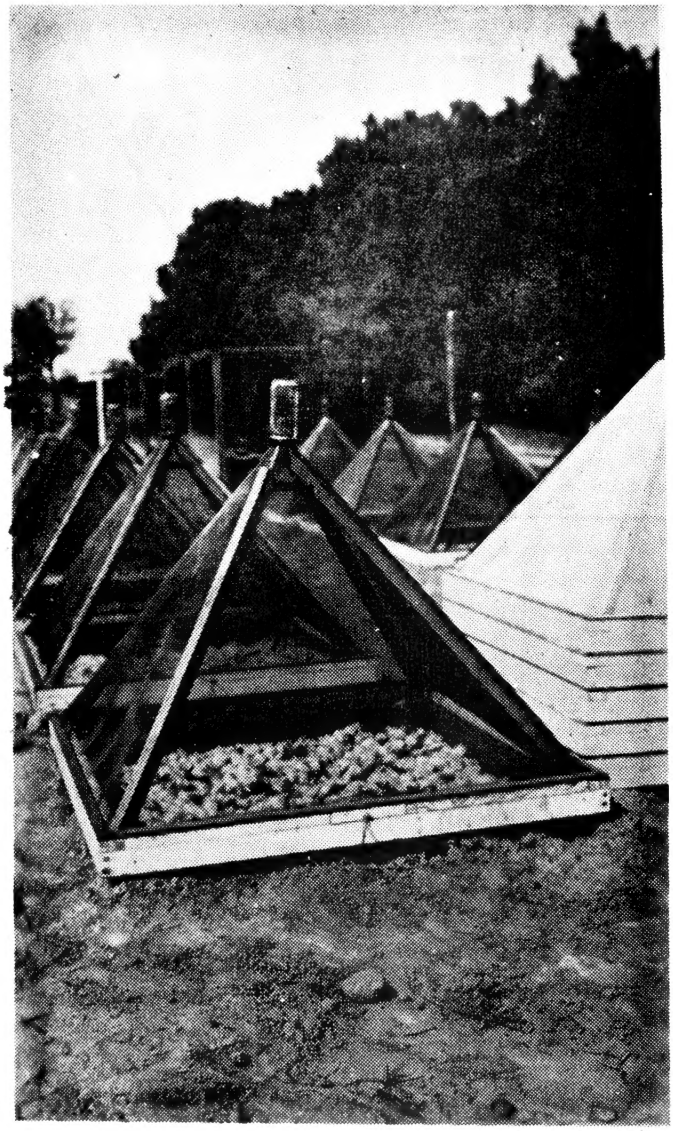

Figure 3.-- Hibernation cages containing cotton bolls infested with pink bollworms.